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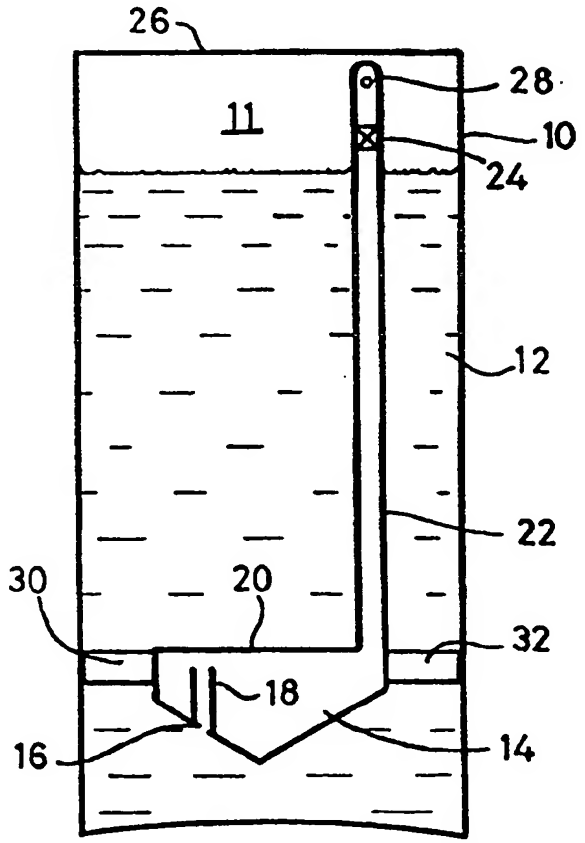
(54) Title: A BEVERAGE CONTAINER WITH MEANS FOR FROTHING THE BEVERAGE

(57) Abstract

A beverage package as described comprising a two piece can (10) having fitted therein a secondary chamber (14) for trapping a volume of gas under pressure which when the can is broached just prior to pouring (or consuming the beverage (12) directly from the can), is emitted from the chamber via a small orifice (16) in the wall thereof. The secondary chamber includes an elongate tube (22), extending from the capsule in an upward sense, which terminates just below the lid (26) of the can. An opening (28) in the wall of the tube communicates with the headspace above the beverage in the can. A one way valve (24) is provided in the tube, adapted to prevent the ingress of beverage. The small orifice (16) in the wall of the secondary chamber may be closed by a bung of gelatine which will melt at a given temperature. Alternatively a bursting disc is described as being fitted, which only requires the pressure drop on broaching the can to burst open the disc and permit the contents of the housing to issue into the can and begin the process of forming the bubbles.



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A BEVERAGE CONTAINER WITH MEANS FOR FROTHING THE BEVERAGE

Field of invention

This invention relates generally to carbonated beverages including alcoholic beverages such as stout and traditional ales which are sold in packaged form ie in sealed bottles and cans.

Background to the invention

It is known to package carbonated drinks and other beverages such as alcoholic drinks containing dissolved gases typically carbon dioxide and nitrogen in pressurised containers such as spun aluminium cans and provide a small supplementary chamber within the can normally at the lower end within which there is trapped under pressure a quantity of gas which when the can is broached and vented to atmosphere, causes a stream of bubbles to emit from a small orifice in the wall of the supplementary chamber so as to cause local nucleation sites in the beverage and form a good reliable foamy head on the beverage not only within the can but also as it is dispensed into a drinking vessel.

One proposal involved injecting gas under pressure into the secondary chamber from outside the can using a hypodermic needle type of device and then resealing the can after the supplementary chamber had been pressurised.

Other procedures have utilised the pressure which

currently exists in such cans after the can has been filled and sealed and which is generally created by nitrogen dosing using liquid nitrogen just before the top is fitted to the can. Since the supplementary chamber is preferably located at the bottom of the can so that the bubbles which emanate from the chamber have maximum froth producing effect, the can has to be inverted so as to cause communication between the secondary chamber and the gas in the head space so that the latter can permeate into the secondary chamber through the tiny orifice through which the gas will bubble when the can is depressurised.

Whilst it is commonplace to invert cans on canning lines prior to pasturisation, can inversion can represent something of a problem since the cans are primarily designed to stand on their base and not on their top. Should a can become unstable as a result of passing through a can twist, and fall or jam, it represents a considerable hazard since a fallen can on such a line can result in damage and certainly a serious stoppage of the line.

It is therefore an object of the present invention to provide an alternative design of insertable secondary chamber which does not require can inversion to achieve pressurisation. This may become desirable in the future if differently styled cans are introduced which are less stable in an upended condition.

Summary of the invention

A beverage package is provided comprising a cannister which is pressurised after being partly filled with a beverage having gas dissolved therein, and a secondary

chamber therein comprising a housing within which gas can be trapped, a restricted orifice in the wall thereof through which gas or other fluid trapped within the container can be forced under the influence of internal pressure within the housing when the cannister is depressurised when opened for dispensing, means for fixing the housing at a desired height within the cannister such that the housing is normally submerged below the surface of the beverage in the cannister and is separated from any gaseous head space at the top of the cannister above the beverage, passage means extending from the housing into the upper regions of the cannister so as to permanently communicate with the head space when the can is upright, and non-return valve means in the passage means or in the housing, or both, so that gas can only flow from the head space into the housing and not vice versa.

It will be seen that by utilising such a secondary chamber within the cannister, any beverage which enters the secondary chamber via the restricted orifice during the filling process will be expelled via the restricted orifice if the level of beverage therein rises above the orifice. By positioning the orifice relatively low down in the housing so the volume thereof which can become filled with beverage can be reduced thereby optimising the volume of the housing available for gas to be stored therein under pressure and which when the can is broached is available for forming the head on the beverage.

Preferably the non-return valve and passage means has a lower resistance to fluid flow than does the restricted orifice so that the secondary chamber is preferentially charged with gas. Selection of appropriate cross-section areas for the passage means and the restricted orifice

will ensure that it is predominently gas from the headspace which enters the container and not beverage via the restricted orifice.

Further steps may be taken during the can filling process to ensure a gas charge by restricting or blocking the restricted orifice in the wall of the container by a temporary bung such as by using a dissolving plug of material such as gelatine or by using a bursting disc designed to fracture only from internal overpressure caused by the eventual opening and depressurisation of the cannister, or a second non-return valve operating in an opposite sense to the first.

A particular advantage of such an arrangement is that the housing container may be made relatively small in cross-section so as to pass straight through a narrow restricted end of a can or bottle and may be provided with resilient fingers to centre the device within the cannister and by making the passage means a relatively rigid structure which extends upwardly to engage the underside of the lid when the latter is fitted in place, the passage means for communicating between the head space and the secondary chamber housing can be used to maintain its position at the lower end of the cannister.

This particular feature is of considerable importance since not only is the cannister handling subsequent to filling and sealing simplified (in that it does not now have to be inverted to cause the secondary chamber to become pressurised), but the step of inserting the secondary chamber into the cannister does not now require relative angular movement of one part relative to another, to enable the secondary chamber housing to be located and

secured in position within the cannister as has characterised previous devices. The only requirement is that any resiliently deformable fingers adapted to centre the device within the cannister are sufficiently flexible to allow the device to be pushed through a restricted opening into the main part of the cannister.

Although the design of the housing forming the secondary chamber is relatively unimportant, it is of course possible that beverage can enter the secondary chamber and become trapped therein. To this end the container is preferably constructed so as to have a well within which any beverage or liquid which has somehow entered the container will be contained well clear of the exit orifice. In addition to the well, the secondary chamber housing preferably includes internal passage means communicating between the restricted orifice at one end and an upper region of the housing so that a considerable depth of liquid can exist within the container before there is any possibility of the beverage in the housing being able to leave through the orifice instead of gas. Thus although it is intended that there will be little or no beverage within the secondary chamber housing should any beverage enter the chamber its effect will be minimised.

Where a second passage means or tube extends internally of the housing as aforesaid, there will be a tendency for this second passage to fill with beverage, so that when the cannister is depressurised on broaching the slug of beverage within the tube has to be forced through the restricted orifice ahead of any gas. However the quantity of liquid will never be greater than the volume of the second passage or tube and by making its cross-section

relatively small, it will be seen that the volume of liquid which has to be displaced before gas can exist will not only be minimal but also consistent. Thus unlike previous secondary chamber designs (where the volume of liquid to be ejected can vary considerably depending on a number of factors) the present design renders each pressurised can consistent in performance to all other similarly constructed cans.

The invention will now be described by way of example, with reference to the accompanying drawings, in which:

Fig 1 is a diagrammatic cross-section elevation of a can having a capsule containing gas under pressure and a passage means associated therewith in accordance with the invention;

Fig 2 is a bottom view of the capsule in the can;

Fig 3 is a top view of the capsule in the can;

Fig 4 is a diagrammatic cross-section elevation of another secondary chamber embodying the invention;

Fig 5 is a top plan view of the other embodiment; and

Fig 6 is a perspective view of the secondary chamber shown in Figures 4 and 5.

In Figures 1 to 3 the can is designated 10 and the beverage within the can is designated 12. Above the beverage is a headspace 11 of gas under pressure. A capsule containing some of this gas under pressure for head generation on dispensing is designated 14. A small

orifice 16 in a lower frusto-conical wall of the capsule 14 allows gas to leave the capsule 14 when the can 10 is broached in a conventional manner to dispense the beverage.

Within the capsule 14 and leading upwardly from the orifice 16 extends a tube 18. This tube extends almost to the lid 20 of the capsule 14 so as to render the capsule less sensitive to orientation of the can during dispensing and thereby prevent any beverage which has entered the capsule from closing off the orifice as it swills around within the capsule during dispensing.

In accordance with the invention a filler tube 22 extends through the lid 20 of the capsule 14 up to and into the head-space 21 above the beverage 12 and which contains gas under pressure typically in the range 2 to 4 bar. Although the tube 12 extends into the headspace 11 when the can is in its normal upright position, clearly if the can is tilted or upended this will no longer be the case and to this end a non-return valve 24 is provided to prevent gas which has entered the capsule from leaving it.

Preferably the non-return valve 24 is closed with a small positive pressure as by a light spring so that in the event that the can is inverted, there is little tendency for liquid to penetrate past the non-return valve and enter the chamber 14.

In order to minimise the entry of beverage into the capsule, the orifice 16 may be closed with a plug of soluble material such as gelatine or may be covered by a bursting disc designed to fracture only from internal

overpressure caused by the eventual opening of the package for consumption.

The tube 20 is shown extending to engage the underside of the lid 26 and the upper end of the tube may be closed and one or more openings such as 28 are provided in the wall of the tube above the valve 24 so as to allow gas to enter the tube 22 from the head space 11.

Three equidistant flexible fingers 20, 32, 34 extend generally radially from around the capsule to engage the inside wall of the can 10. In this way the capsule will be held centrally within the can and will be held near the bottom of the can by virtue of the upstanding tube 22.

Although not shown, a non-return valve may be associated with the orifice 16 typically in the form of a small buoyancy member which lodges against the orifice to close it off when the capsule is submerged in a liquid. However in the presence of an over-pressure (such as will exist when the can is broached), the pressure of the gas within the capsule will displace the small buoyancy member away from the orifice to enable gas from within the capsule to be expelled and form the string of bubbles needed to produce the head formation. The advantage of such a device is that there will then be little tendency for any beverage to enter the capsule, and the latter will be charged predominently with gas all derived from the headspace 11 with the can 10 whilst the latter is in its upright position.

Although the invention is of primary application to alcoholic beverages on which a head is desired when dispensed, it is equally applicable to non-alcoholic

carbonated beverages and the like.

The tube 22 allows the capsule 14 to be filled with gas during the can filling process. To this end the capsule is inserted into the can immediately before filling with the beverage. The beverage is poured in until the headspace 11 exists. A source of liquid nitrogen under pressure is attached to the upper end of the protruding tube 22 and a small charge of liquid nitrogen is injected into the tube and thereby into the capsule 14. Immediately thereafter the lid 26 is secured by seaming in known manner to the can.

The liquid nitrogen charge within the capsule will boil and evaporate to form gas which because of the non-return valve 24 will all bubble out through the orifice 16 until the headspace pressure and the pressure of the gas remaining within the capsule are equal. In this way the capsule will be charged wholly from within and if a gelatine or like seal or a bursting disc seal or a flotation member normally closing off the orifice 16 is provided, capsule interior will remain totally dry and contain only gas. The presence of the non-return valve 24 will prevent the ingress of beverage to the capsule 14, and all of the volume of the capsule will therefore be available for storing gas under pressure until the can is broached when the gas will exit as a stream of bubbles through the orifice 16 to form the foaming head.

As seen in Figure 3, the tube 22 is off centre so that the device is assymetrical.

An alternative symmetrical design of device is shown in Figures 4 to 6. Here the tube is relocated so as to be

central of the capsule.

In Figure 4, the capsule is 36 and the tube 38. The upper end of 38 indicated as opening 39 and one way valve 41. The internal tube 18 is also relocated so as to be coaxial with the tube 38 as shown at 40. The orifice 16 is replaced by a small orifice 42 in an extension 44 of the tube 40 which protrudes centrally through the base of the capsule 36.

Radial wings 48, 49, 50 extend from the capsule 36 to engage the inside of the can 10.

Upwardly inclined radial fingers 52, 54, 56 extend from the upper end of the tube 38 to engage the can just below the lid 58.

The upper end of the tube 38 is located just below the lid 58 so that the capsule is held in position at the bottom of the can, even though its bouyancy tends to force it upwards.

CLAIMS

1. A beverage package comprising a cannister which is pressurised after being partly filled with a beverage having gas dissolved therein, and a secondary chamber therein comprising a housing within which gas can be trapped, a restricted orifice in the wall thereof through which gas or other fluid trapped within the container can be forced under the influence of internal pressure within the housing when the cannister is depressurised when opened for dispensing, means for fixing the housing at a desired height within the cannister such that the housing is normally submerged below the surface of the beverage in the cannister and is separated from any gaseous head space at the top of the cannister above the beverage, passage means extending from the housing into the upper regions of the cannister so as to permanently communicate with the head space when the can is upright, and non-return valve means in the passage means or in the housing, or both, so that gas can only flow from the head space into the housing and not vice versa.

2. A beverage package as claimed in claim 1, wherein the orifice is positioned relatively low down in the housing so that the volume thereof which can become filled with beverage is small thereby increasing the volume of the housing available for gas to be stored therein under pressure, and which when the can is broached is available for forming the head on the beverage.

3. A beverage package as claimed in claim 1 or 2, wherein

the non-return valve and the passage means has a lower resistance to fluid flow than does the restricted orifice so that the secondary chamber is preferentially charged with gas.

4. A beverage package as claimed in claim 3, wherein the selection of the cross-sectional area for the passage means and the restricted orifice is such that it is predominently gas from the headspace which enters the container and not beverage via the restricted orifice.

5. A beverage package as claimed in any of claims 1 to 4, wherein during the can filling process to ensure a gas charge by the restricted orifice in the wall of the container(s) restricted or blocked by a temporary bung such as a dissolving plug of material such as gelatine or by using a bursting disc designed to fracture only from internal overpressure as caused by the eventual opening and depressurisation of the cannister, or a second non-return valve operating in an opposite sense to the first.

6. A beverage package as claimed in any of claims 1 to 5, wherein the housing container is made relatively small in cross-section so as to pass straight through a narrow restricted end of a can or bottle and is provided with resilient fingers to centre the device within the cannister.

7. A beverage package as claimed in any of claims 1 to 6, wherein making the passage means comprises a relatively rigid structure which when fitted within a cannister extends upwardly to engage the underside of the cannister lid when the latter is fitted in place and the passage means for communicating between the head space and the

secondary chamber housing serves to maintain the position of the chamber housing at the lower end of the cannister.

8. A beverage package as claimed in any of claims 1 to 7, wherein the secondary chamber is constructed so as to have a well therewithin, in which any beverage which has somehow entered the container will be contained well clear of the exit orifice.

9. A beverage package as claimed in any of claims 2 to 8, wherein the secondary chamber housing includes passage means communicating between the restricted orifice at one end and an internal upper region of the housing aat its other end so that a considerable depth of liquid can exist within the container before the trapped beverage is able to leave through the orifice instead of gas.

10. A beverage package constructed and adapted to function as aforesaid and wherein the secondary chamber housig is constructed and fitted into a cannister as described herein and as shown in the accompanying drawings.

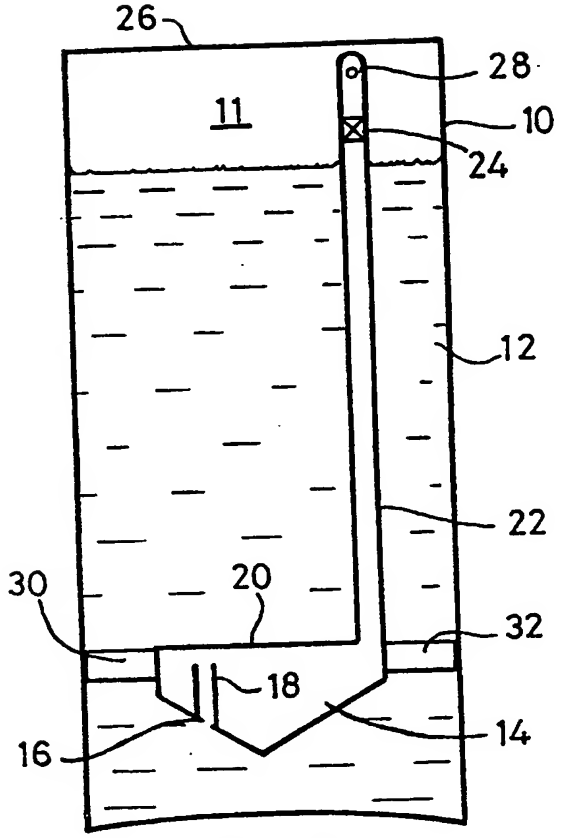

Fig. 1

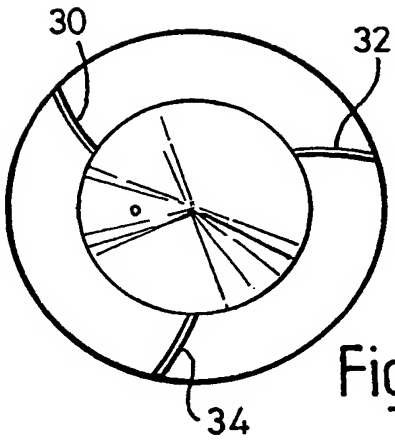

Fig. 2

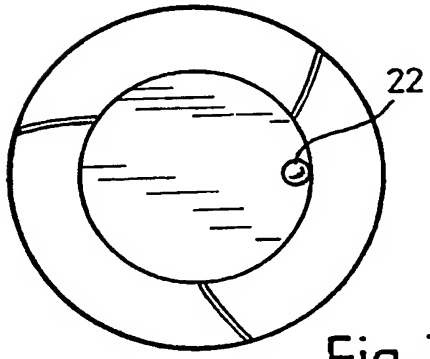

Fig. 3

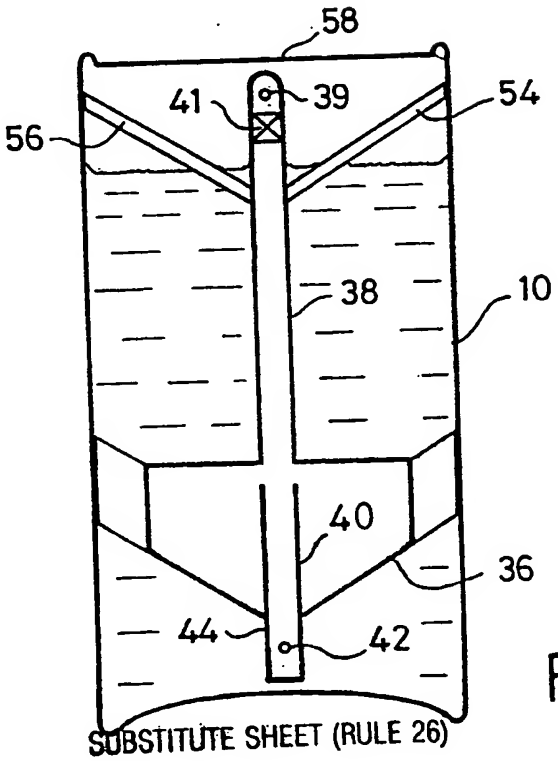

Fig. 4

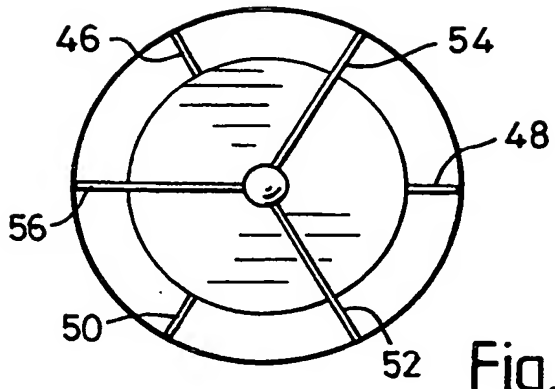

Fig. 5

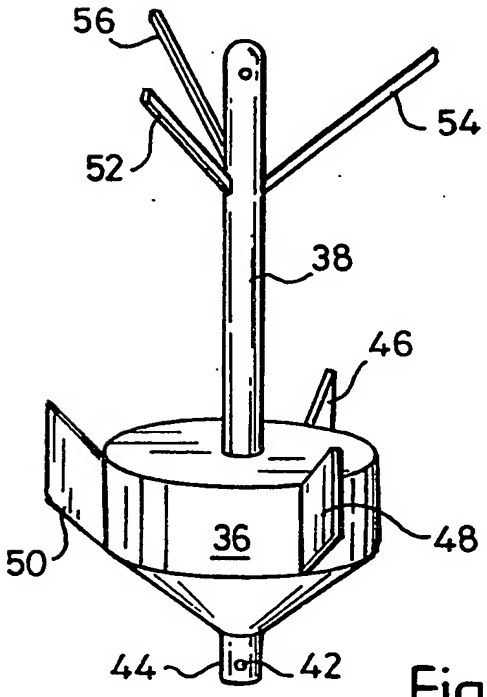

Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB 94/00552

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 B65D79/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 5 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP,A,0 520 602 (GUINNESS LTD.) 30 December 1992 see the whole document	1,2
A,P	GB,A,2 267 882 (SCOTTISH & NEWCASTLE) 22 December 1993 see page 4, line 20 - page 5, line 33; figure 1	1,3
A,P	WO,A,93 15973 (HEINEKEN & WHITBREAD) 19 August 1993 see figure 15E	1,8
A	WO,A,92 00897 (CAMERON PRICE) 23 January 1992 see page 7, last paragraph - page 8, line 31; figure 4	1,2

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 June 1994	16. 06. 94

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB94/00552

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 10
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
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3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searches without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/GB 94/00552

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP-A-0520602	30-12-92	GB-A-	2257107	06-01-93
		AU-A-	1844592	07-01-93
		CA-A-	2072032	26-12-92
		US-A-	5196216	23-03-93
GB-A-2267882	22-12-93	NONE		
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